REVISION OF THE BRAZILIAN HEMISPHERIC OVARY CLADE OF *VELLOZIA* (VELLOZIACEAE) WITH THE NEW *V. RELIGIOSA*[1]

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ABSTRACT

Species of the hemispheric ovary clade of the Velloziaceae are presented. The Vellozia hemisphaerica group is endemic to the Espinhaço Range in Bahia, Brazil, and is composed of the five species *Vellozia canelinha* Mello-Silva, *V. caudata* Mello-Silva, *V. hemisphaerica* Seub., *V. jolyi* L. B. Sm., and *V. religiosa* Mello-Silva & D. Sasaki. The group is a monophyletic assemblage supported by an ovary outline that is broader than long and other plastid and nuclear molecular characters, as well as non-molecular characters. Identification keys for the species group, their morphological and anatomical descriptions, as well as comments on the affinities of the species and character evolution based on previous cladistic analysis, geographical distribution, and conservation status are presented. A new species, *V. religiosa*, is described, and *V. burlemarxii* L. B. Sm. & Ayensu and *V. campanuloides* Mello-Silva are synonymized with *V. hemisphaerica* and *V. caudata*, respectively. Lectotypification of the name *V. hemisphaerica* is also provided.

Key words: Bahia, Brazil, IUCN Red List, *Vellozia*, Velloziaceae.

The first species of the hemispheric ovary group of Velloziaceae were placed together by Smith and Ayensu (1976), who described and put *Vellozia burlemarxii* L. B. Sm. & Ayensu near *V. hemisphaerica* Seub. in their identification key. Both species were characterized by a hemispheric ovary (Figs. 1G, 2E, 3C, D) and minor vascular bundles in leaf blades (Fig. 4A–E, G). Later, Menezes (1980) included *V. jolyi* L. B. Sm. within the group, formally described afterward by Smith (1985). More recently, *V. campanuloides* Mello-Silva, *V. canelinha* Mello-Silva, and *V. caudata* Mello-Silva were also associated with the group (Mello-Silva, 1993). In Mello-Silva (2005), *V. burlemarxii*, *V. caudata*, *V. hemisphaerica*, and *V. jolyi* formed a clade supported by a hemispheric ovary, i.e., an ovary outline that is broader than long. However, this clade had no internal resolution. *Vellozia religiosa* Mello-Silva & D. Sasaki, a new species, is now described herein, and the names *V. burlemarxii* and *V. campanuloides* are synonymized to *V. hemisphaerica* and *V. caudata*, respectively. According to results from Mello-Silva et al. (2011), these species, all from Espinhaço Range in Bahia, Brazil, emerge as a monophyletic group and the clade is supported, among other characters, by the hemispheric ovary. Systematics of the group is presented, along with consideration of the results of cladistic analysis, identification keys, morphological and anatomical descriptions, relationships among species, evolution of selected characters, geographical distribution, and conservation status.

MATERIALS AND METHODS

Morphological and anatomical studies are based on dried and on dried and spirit collections, respectively. Anatomical descriptions, regarded as absolutely necessary for the systematics of the Velloziaceae (Mello-Silva, 1996), follow those of Mello-Silva (1990, 2000), Menezes (1971), and Smith and Ayensu (1976). The delimitation of species is based on the taxonomic species concept, in which a species is defined by an exclusive feature or a combination of them, in an attempt to substantiate a natural unit (Rieppel, 2007; Assis & Brigandt, 2009). Exsiccatae are deposited in listed herbaria, acronyms according to Thiers (2015, continuously updated). All cited specimens have been examined, except where indicated. Author names are abbreviated according to IPNI (<http://www.ipni.org>). Distribution maps are based on those from Instituto Brasileiro de Geografia e Estatística (1972)

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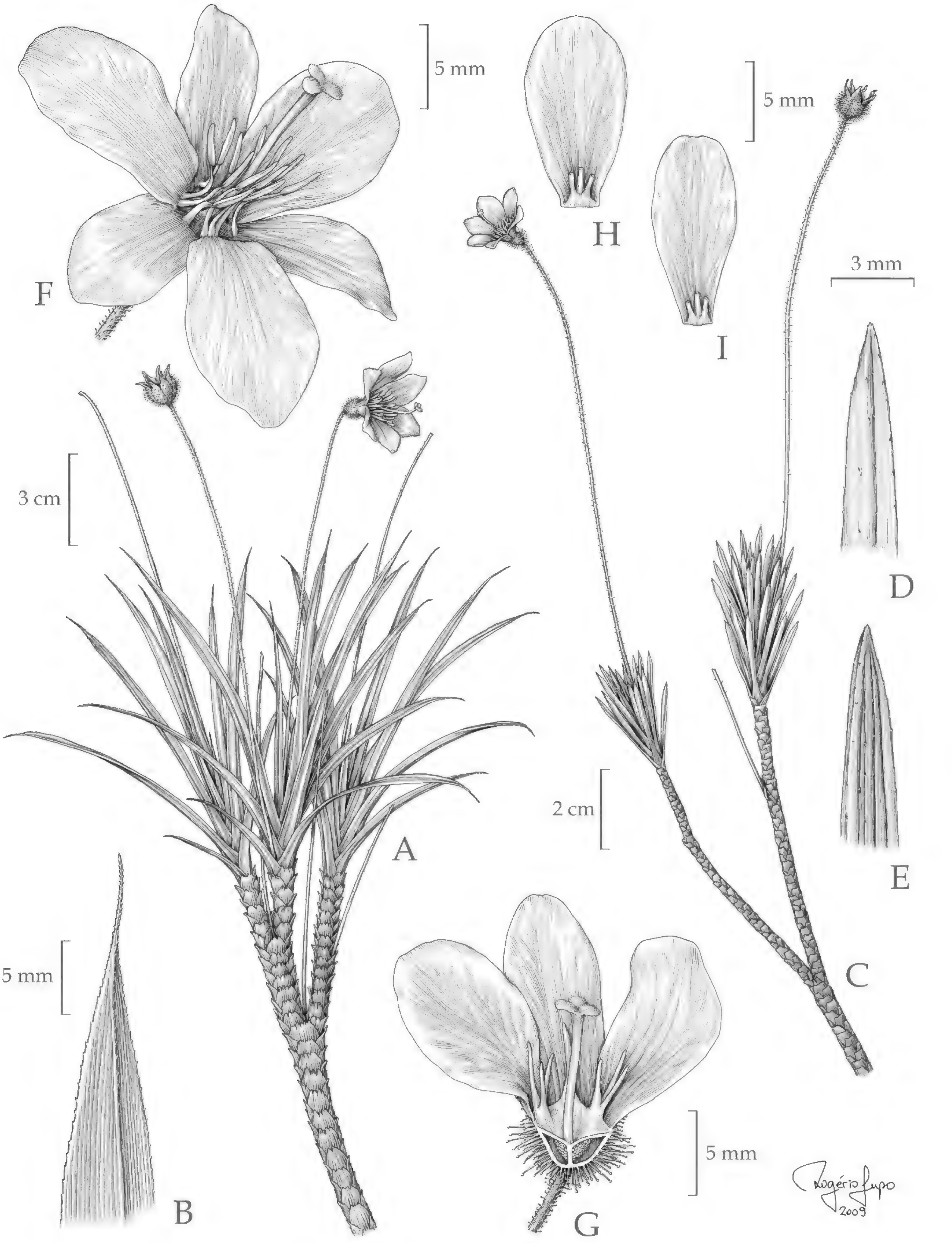

Figure 1. A, B. *Vellozia caudata* Mello-Silva. —A. Habit with flower and fruit. —B. Apex of lamina, abaxial side. C–I. *Vellozia religiosa* Mello-Silva & D. Sasaki. —C. Habit with flower and fruit. —D. Apex of lamina, abaxial side. —E. Apex of lamina, adaxial side. —F. Flower, showing 12 stamens. —G. Longitudinal section of flower with anthers removed, showing solitary stamen opposite to sepals and phalange of three stamens opposite to petals, and depressed obovoid hypanthium and ovary. —H, I. Petals, adaxial side, showing base of phalange of three stamens. A, B drawn from *R. Mello-Silva 2565* (SPF); C–I, from *B. L. Stannard H51864* (SPF).

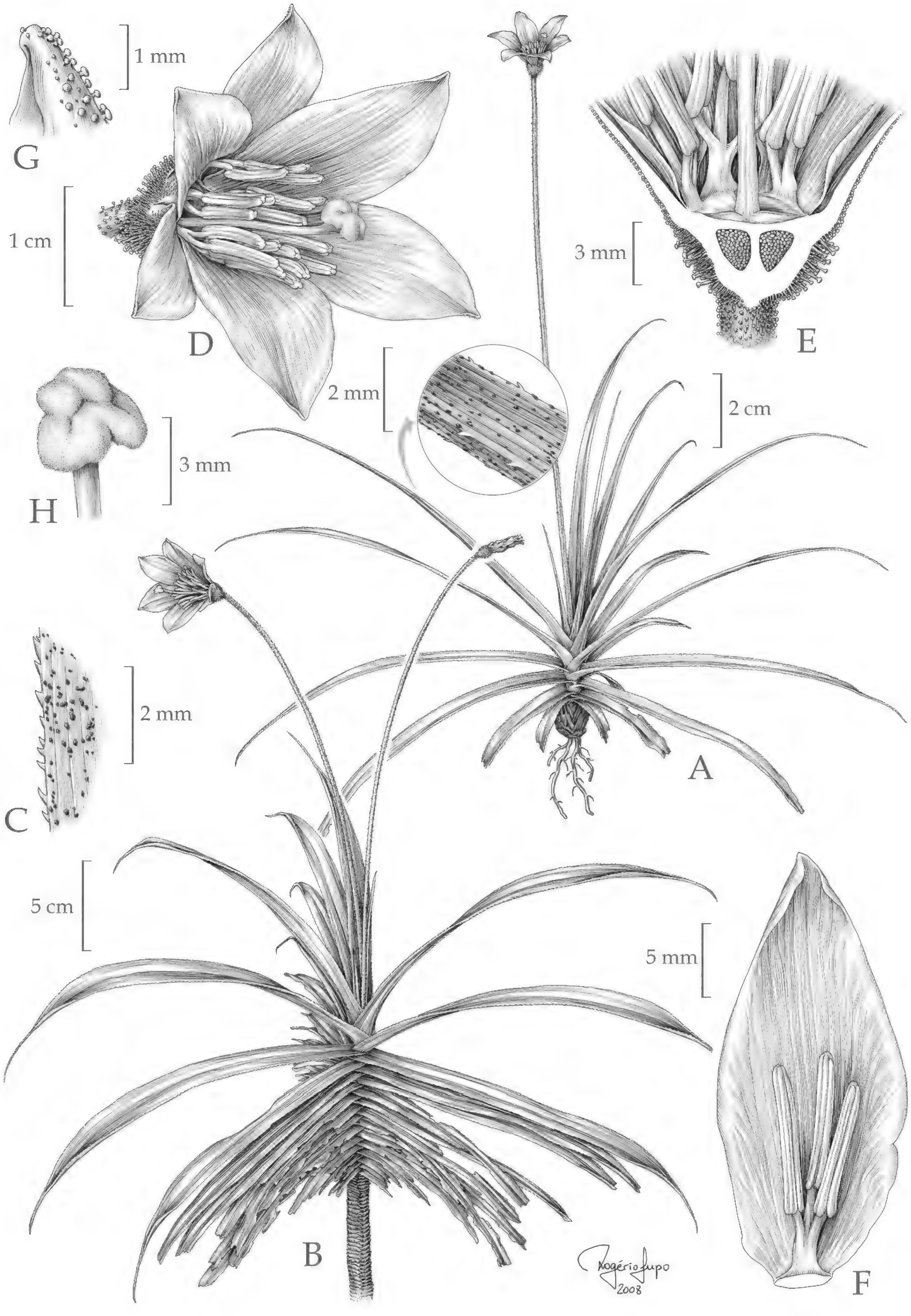

Figure 2. *Vellozia hemisphaerica* Seub. —A, B. Fertile habits with flower. —C. Detail of leaf margin, showing glandular-punctate adaxial surface and serrate margin. —D. Flower, showing 18 stamens. —E. Longitudinal section of proximal region of flower, showing phalanges of three stamens opposite to sepals and petals, and depressed obovoid hypanthium and ovary. —F. Petal, adaxial side, showing phalange of three stamens. —G. Sepal apex showing short glandular capitate-stipitate emergences on abaxial surface. —H. Apex of style with stigma. A is illustrated from *R. Mello-Silva 2800* (SPF); B–H, from *A. A. Conceição 184* (SPF).

and modified in ArcView (ESRI, 1999). Ink drawings are by Rogério Lupo.

THE HEMISPHERIC OVARY SPECIES GROUP IN CLADISTIC ANALYSES

Characters and cladistic support

In an initial cladistic analysis of morphological characters involving more than one species of the group (Mello-Silva, 2005), *Vellozia burlemarxii*, *V. caudata*, *V. hemisphaerica*, and *V. jolyi* emerged as a monophyletic assemblage, although without internal resolution. A hemispheric ovary (non-homoplastic within Velloziaceae), minor vascular bundles in the leaf blade, and a circular trilobate ovary were supporting synapomorphies.

In a second analysis with plastid and nuclear molecular characters, as well as morphological characters (Mello-Silva et al., 2011), nine terminals represented the hemispheric ovary group. The interrelationships from the consensus tree, (((*V. burlemarxii*, *V. campanuloides*, *V. caudata*, *Vellozia* aff. *caudata*, *V. hemisphaerica* 1, *V. hemisphaerica* 2) *V. canelinha*) (*V. jolyi*, *V. religiosa*)), were not well defined, but the group was supported by a non-homoplastic hemispheric ovary and by three homoplastic characters: specialized cells on the lamina surface (Fig. 3G), a circular, trilobate ovary, and poricidal capsules. Minor vascular bundles, which are smaller and situated above furrows, alternated with the normal ones in the leaf blade (cf. Fig. 4A–E, G), appear to have had a parallel evolution, both within and outside the clade. Within the hemispheric ovary group, they have appeared as a convergence in (*V. caudata*–*V. hemisphaerica*) and in *V. religiosa*, and outside the group in *V. plicata* Mart. from Brazil and *Xerophyta eglandulosa* H. Perrier from Africa. Each of the two main clades within the group ((*V. caudata*–*V. hemisphaerica*) *V. canelinha*) and (*V. jolyi*–*V. religiosa*) was supported by homoplastic synapomorphies. ((*Vellozia caudata*–*V. hemisphaerica*) *V. canelinha*) was supported by coronulate papillae in the furrows of the leaf blade (Fig. 4A–F) and (*V. jolyi*–*V. religiosa*) by spirotristichous phyllotaxis (Mello-Silva et al., 2011).

Autapomorphies of *Vellozia canelinha* are noteworthy. While it demonstrates an unusual habit within the group, with plants that grow up to 3 m, it has characters that are otherwise found in other significant clades within *Vellozia* Vand. These include fringed corona (Sajo et al., 2010) and ridged subsidiary cells in the stomata (Mello-Silva et al., 2011) as well as an aquiferous hypodermis extending only to bundle sheaths (cf. Fig. 4F, H, I), which characterizes both *V. canelinha* and *V. jolyi* and is one of the characters that distinguishes the latter from its sister species, *V. religiosa*.

Eighteen stamens seem to be the basal condition in the genera (Menezes, 1980; Mello-Silva et al., 2011) and within the hemispheric ovary group. Within this group, 12 stamens could be a synapomorphy of the clade (*Vellozia jolyi*–*V. religiosa*) that has reverted to 18 in some populations of *V. jolyi*, or as a derived situation independently acquired by *V. religiosa* and some populations of *V. jolyi* (Mello-Silva et al., 2011). The dramatic increase in stamens in *V. canelinha*, up to 66, is remarkable, even among monocotyledons in general (Endress, 1995). This could suggest an apparent multiplication from an ancestor with 18 stamens, or it might indicate the existence of an extinct or yet unknown species with an intermediary number of stamens within the lineage of *V. canelinha*.

Internal relationships and synonymies

In Mello-Silva et al. (2011), the consensus of the total analyses revealed no definition among *Vellozia burlemarxii*, *V. hemisphaerica*, and *V. campanuloides*, *V. caudata*, or *Vellozia* aff. *caudata*. Nevertheless, the morphological analysis alone, although more unresolved as a whole, provided different information. *Vellozia burlemarxii* as sister to *V. hemisphaerica* has been supported by six character states, among them the absence of an abscission line between the sheath and lamina, which is exclusive within the group, and the triangular transverse section of the adult stem, a state shared only with *V. canelinha*, otherwise a quite distinct species. *Vellozia campanuloides*, *V. caudata*, and *Vellozia* aff. *caudata* share the same three character states (phyllotaxis tristichous, leaf blades arcuate, and presence of minor fibrovascular bundles); *V. caudata* and *Vellozia* aff. *caudata* additionally share revolute leaf blades, denoting their morphological resemblance. This evidence has been used here to maintain the submergence of these species and populations.

TAXONOMIC TREATMENT

1. **Vellozia canelinha** Mello-Silva, Kew Bull. 48: 5. 1993. TYPE: Brazil. Bahia: Rio de Contas, Pico das Almas, E slopes, Queiroz field, near track of Silvina farm, 13°32′S 41°57′W, 1500 m, 31 Oct. 1988, *R. M. Harley 25810* (holotype, SPF!; isotypes, CEPEC!, E!, K!, MBM!, RB!, UEC!, US!).

Solitary, dracenoid plants; stems branched, (0.8–) 2–3 m, 5–9 mm diam. at apex. Leaves tristichous, 5 to 12 extant along apex of each branch; leaf sheaths brown, light brown at apex, glabrous, or sometimes

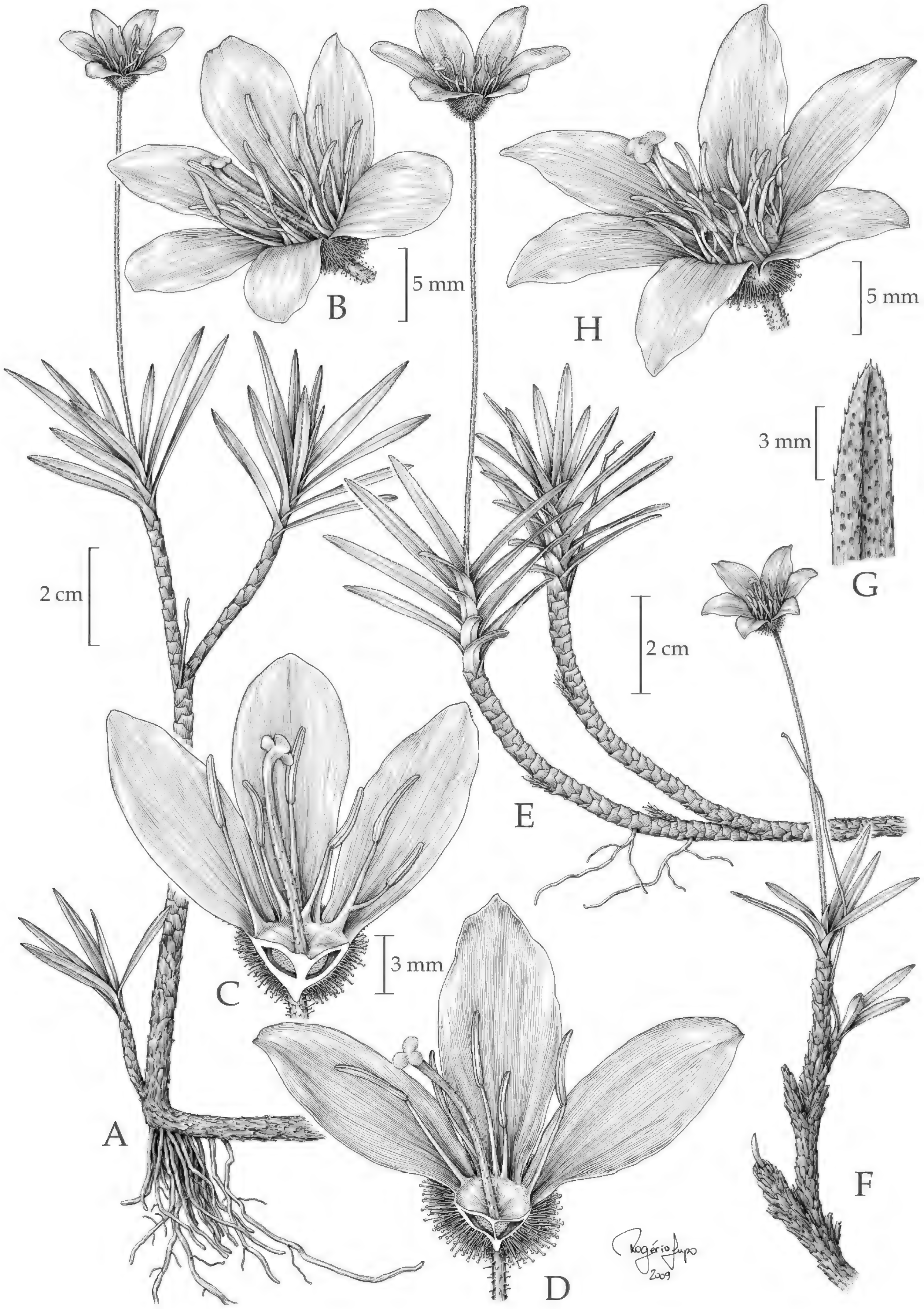

Figure 3. *Vellozia jolyi* L. B. Sm. —A, E, F. Fertile habits with flower. —B. Flower, showing 12 stamens. —C. Longitudinal section of flower showing solitary stamen opposite to one sepal, a phalange of two stamens opposite to another sepal and a phalange of three stamens opposite to a petal, and depressed obovoid hypanthium and ovary. —D. Longitudinal section of flower showing solitary stamen opposite to sepals and phalange of three stamens opposite to petals, and depressed obovoid hypanthium and ovary. —G. Leaf apex, showing glandular-punctate adaxial surface and serrate margins. —H. Flower, showing 18 stamens. A–D is drawn from *A. M. Giulietti CFCR7092* (SPF); E, from *R. Mello-Silva 2146* (SPF); F–H from *A. A. Conceição 983* (SPF).

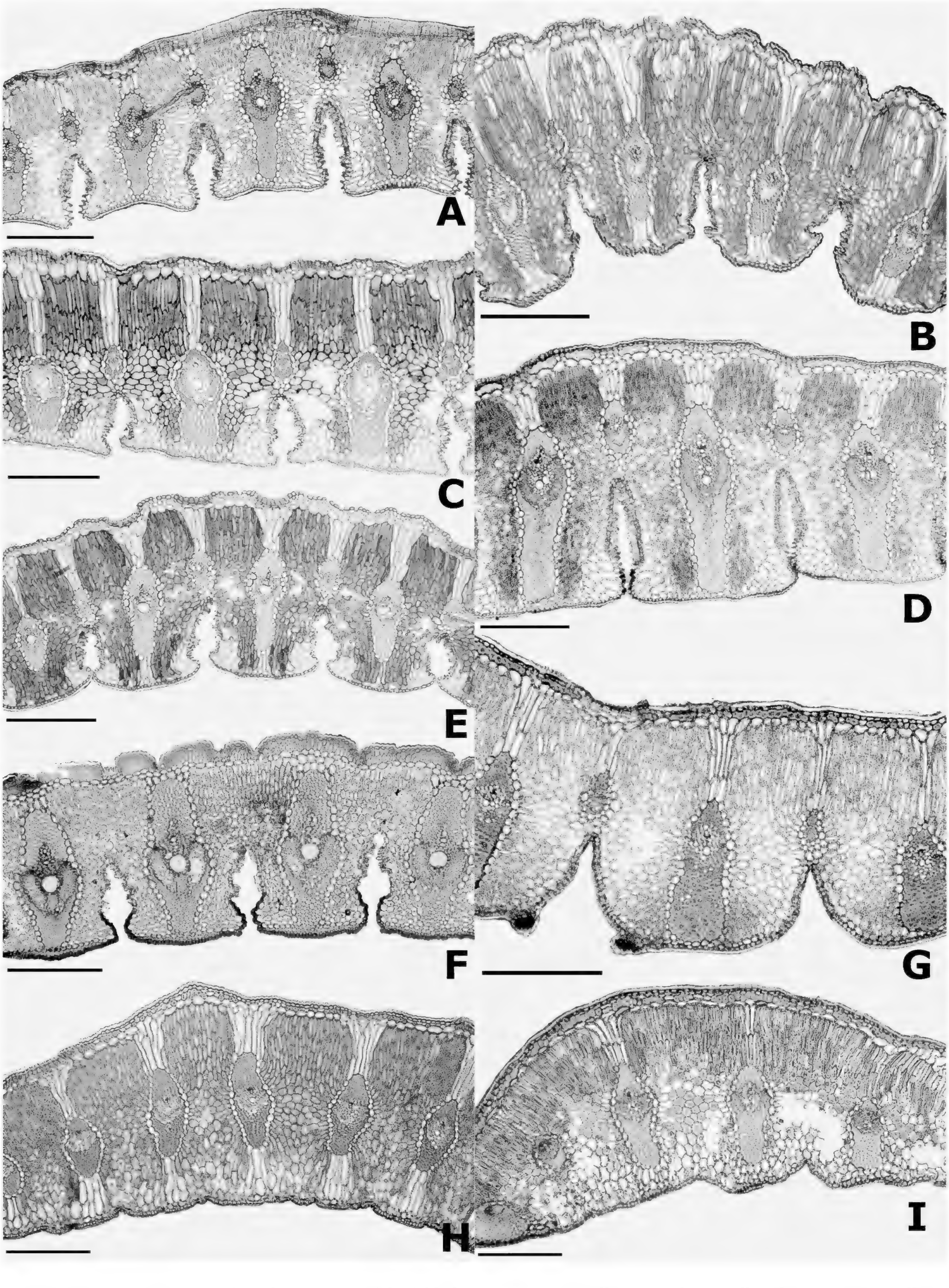

Figure 4. Cross section of median region of leaf blade. —A, C, D. *Vellozia caudata* Mello-Silva. —B, E. *Vellozia hemisphaerica* Seub. —F. *Vellozia canelinha* Mello-Silva. —G. *Vellozia religiosa* Mello-Silva & D. Sasaki. —H, I. *Vellozia jolyi* L. B. Sm. Scale bars = 200 μm. (A from *R. M. Harley 26521*, SPF; B from *F. França 2785*, SPF; C from *W. Ganev 1296*, SPF; D from *R. M. Harley 26700*, SPF; E from *A. A. Conceição 184*, SPF; F from *R. M. Harley 26570*, SPF; G from *R. M. Harley 20737*, SPF; H from *A. A. Conceição 187*, SPF; I from *K. Mori s.n.*, SPF 32977).

with emergences abaxially; leaf lamina 5.5–36 cm, 4–7 mm wide at base, linear-triangular, long attenuate, arcuate, revolute when dry, soon deciduous by abscission line, glabrous, adaxial surface densely glandular punctate, margins serrate or rarely entire, central nervature serrate on abaxial surface of proximal portion or sometimes along full length. Flowers 1 to 3 at each branch; pedicels 8–13 cm, purple, trigonous, laxly covered with glandular capitate-stipitate emergences. Hypanthium depressed-obovoid, circular-trigonous, 4–6 × 6–8 mm, densely covered with glandular capitate or stipitate, purple emergences, up to 3 mm; hypanthium tube absent; perianth oblong-elliptic to elliptic, violet; sepals 27–33 × 7–10 mm, petals ca. 25 × 1.2 mm; short glandular capitate-stipitate emergences laxly covering abaxial surface of sepals and proximal half of central nervature of petals; stamens 48 to 66, in phalanges of 8 to 11; filaments 6–8 mm, purple; anthers ca. 3 mm, yellow; corona violet; style ca. 20 mm, greenish; stigma ca. 1.5 mm diam., pale yellow. Capsule poricidal by apical slits on loculi, (3–)5–10 × 5–12 mm, hypanthium persistent; seeds ca. 0.7 mm, brown.

Leaf anatomy. Lamina dorsiventral; trichomes absent; cuticle thickened on adaxial surface; abaxial furrows ca. 1/3 thickness of lamina, coronulate-papillate; stomata confined to furrows; subsidiary cells ridged; specialized cells present on both surfaces; adaxial epidermis 3-seriate, sclerified except for short 2-seriate regions; abaxial epidermis 2-seriate, 1-seriate inside furrows; aquiferous 1-seriate hypodermis present on both surfaces, extending adaxially to bundle sheaths as aquiferous parenchyma; palisade mesophyll 4 cell-layers thick, adaxially merging with lacunar mesophyll; fibrovascular bundles of same type, surrounded by distinct bundle sheath; 1 large vessel present in each fibrovascular bundle; phloem strands 2, V-shaped, separated beneath xylem by fibers; fibers extending as girders, adaxially to aquiferous parenchyma and abaxially to hypodermis. Figure 4F.

Pedicel anatomy. Triangular in transverse section; fibrovascular bundles 8 to 12; belt of sclerified cells present.

Phenology. *Vellozia canelinha* has been collected in flower in October and November, and in fruit from January through March and in October.

Distribution. *Vellozia canelinha* is endemic to Rio de Contas region in Bahia and is particularly abundant in Pico das Almas slopes, in large populations on rocky outcrops at elevations from 950 to 1500 m. Figure 5C.

IUCN Red List category. Although narrowly distributed, populations of *Vellozia canelinha* are extensive and occur over non-utilizable grounds. Thus, its conservation status is probably best described as Least Concern (LC), according to IUCN (2001) criteria.

Vernacular name and etymology. Canelinha, the Portuguese local name of the species, means small canela-d'ema, the vernacular name of several Velloziaceae for the resemblance of their stems to the skin pattern visible on the greater rhea's shin. The epithet is taken from the vernacular name, which is used as a noun in apposition.

Discussion. *Vellozia canelinha* is quite distinct from the other species of the group. The main differences are the dracenoid habit, with stems reaching 3 m tall, and the 48 to 66 stamens, which are among the highest numbers among the Velloziaceae and even among monocotyledons (Endress, 1995). The corona and ridged subsidiary cells in the stomata are also unique within the group, though present in one other clade of *Vellozia* (Mello-Silva et al., 2011). The absence of minor fibrovascular bundles is a probable reversion homoplastically shared with *V. jolyi* (Mello-Silva et al., 2011). The stems from *V. canelinha* are sold and used by local people to prepare decoctions that are said to be effective remedies for kidney and liver diseases (Mello-Silva, 1993).

Additional specimens examined. BRAZIL. **Bahia:** Rio de Contas, rd. to Fraga falls, Brumado river, 3 km of Rio de Contas, *A. Furlan CFCR1675* (K, NY, SPF, UEC); Feb. 1987, *J. R. Pirani s.n.* (SPF 49381); track to Fraga falls, *M. M. Silva 120* (HUEFS, SPF); rd. near Fraga falls, 13°35′56″S 41°49′36″W, *R. Mello-Silva 2131* (K, SPF [2]); Pico das Almas, E slopes, SE of Queiroz, 13°32′S 41°58′W, *R. M. Harley 26570* (CEPEC, F, K, R, SP, SPF, UB); Pico das Almas, Queiroz, near curral entrance, 13°31′02″S 41°57′00″W, *R. Mello-Silva 2140* (HUEFS, K, SPF); ca. 8 km from city on rd. to Livramento do Brumado, *V. C. Souza 5294* (K, SPF [2]).

2. **Vellozia caudata** Mello-Silva, Kew Bull. 48: 6. 1993. TYPE: Brazil. Bahia: Rio de Contas, Pico das Almas, E slopes, S of Queiroz, 13°32′S 41°57′W, 1500 m, 30 Nov. 1988, *R. M. Harley 26521* (holotype, SPF!; isotypes, CEPEC!, E!, K!, MBM!, RB!, SP!, UB!, US!). Figure 1A, B.

Vellozia campanuloides Mello-Silva, Kew Bull. 48: 1. 1993, syn. nov. TYPE: Brazil. Bahia: Érico Cardoso (Água Quente), Pico das Almas, valley NW of Pico das Almas,

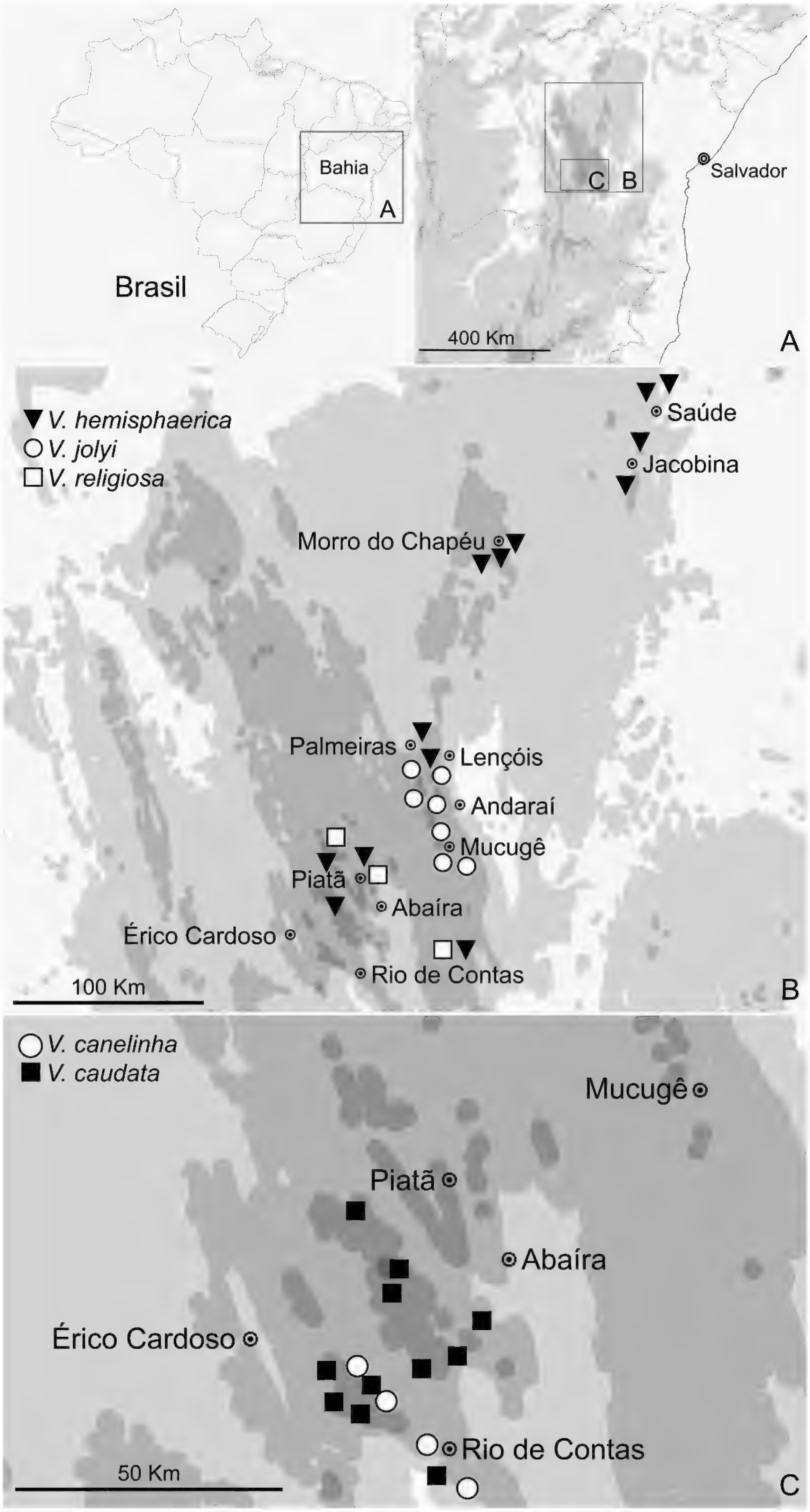

Figure 5. Distribution of the species in Brazil. —A. Espinhaço Range in Minas Gerais and Bahia States. —B. Espinhaço Range in Bahia. —C. Southern Espinhaço Range in Bahia. White: 0–500 m; light gray: 500–1000 m; medium gray: 1000–1500 m; dark gray: 1500–2000 m.

13°30′S 41°59′W, elev. 1450 m, 29 Nov. 1988, *R. M. Harley 26700* (holotype, SPF!; isotypes, CEPEC!, K!, MBM!, RB!, SP!, US!).

Caespitose plants; stems branched, 3.5–35 cm, 2–14 mm diam. at apex. Leaves tristichous, 4 to 15 extant along apex of each branch; leaf sheaths brown, light brown to cinereous at apex, glabrous; leaf lamina 2–17 cm, 1–10 mm wide at base, linear-triangular, caudate to rarely long attenuate, arcuate, revolute when dry, rarely involute, soon deciduous by abscission line, glabrous, rarely with very sparsely disposed emergences abaxially, adaxial and sometimes abaxial surface densely glandular punctate, margins serrate, entire toward base, central nervature sometimes serrate toward apex on abaxial surface. Flower 1 at each branch; pedicels 2–21 cm, purplish, trigonous, laxly covered with glandular capitate-stipitate emergences. Hypanthium depressed obovoid, circular to trigonous, 2–6 × 3–9 mm, light green to purplish green, densely covered with glandular capitate or stipitate, purple emergences, up to 4 mm; hypanthium tube absent; perianth oblong-elliptic to elliptic, purple; sepals 14–32 × 6–8 mm, petals 14–31 × 7–13 mm wide; short glandular capitate or stipitate emergences laxly covering abaxial surface of sepals and proximal half of central nervature of petals; stamens (16 to)18, in phalanges of 3; filaments 4–7 mm, purple to white; anthers 7–8 mm, yellow; corona absent; style 10–22 mm, greenish to yellowish white; stigma 3–4 mm diam., yellow. Capsule poricidal by apical slits on loculi, 2–8 × 3–13 mm, hypanthium persistent; seeds not seen.

Leaf anatomy. Lamina dorsiventral; trichomes absent; cuticle thickened on both surfaces; abaxial furrows ca. 1/2 thickness of lamina, coronulate-papillate; stomata confined to furrows, few present on abaxial surface; subsidiary cells smooth; specialized cells present on adaxial, rarely on abaxial, surface; adaxial epidermis 1- to 3-seriate, abaxial epidermis 1- or 2-seriate; aquiferous 1-seriate hypodermis present on both surfaces, extending adaxially to bundle sheaths as aquiferous parenchyma, and sometimes extending abaxially to inferior region of furrows; palisade mesophyll 3 or 4 cell-layers thick, adaxially merging with lacunar mesophyll; fibrovascular bundles of two types, smaller type radially arranged above furrows, both surrounded by a distinct bundle sheath; large vessels 1 to 3(4) present in each larger fibrovascular bundle, (0)1(2) in each smaller fibrovascular bundle; phloem strands 2, V-shaped, separated beneath xylem by fibers, or in smaller bundles separated by parenchyma or united beneath xylem; fibers extending as girders, adaxially to aquiferous parenchyma and abaxially to hypodermis; bundles of subepidermal sclerified cells 1 or 2 cell-layers thick present beneath adaxial surface. Figure 4A, C, D.

Pedicel anatomy. Triangular in transverse section; fibrovascular bundles 6 to 12; belt of sclerified cells present.

Distribution. *Vellozia caudata* is endemic to Abaíra, Érico Cardoso (Água Quente), Rio de Contas, and the highest elevations of Chapada Diamantina, in Bahia, mostly at elevations from 1000 to 1900 m. It grows on large, horizontal, bare rocks, building up thickets of varying sizes (Mello-Silva, 1993) in places with sandy soil, or among rocks, on rocky soil. Figure 5C.

Phenology. *Vellozia caudata* flowers from October to April (to August), in the rainy season, and fruits throughout the year.

IUCN Red List category. There are many and numerous populations distributed over non-utilizable grounds. Thus, its conservation status is probably best described as Least Concern (LC), according to IUCN (2001) criteria.

Etymology. The epithet is derived from the caudate apices of the leaves.

Discussion. *Vellozia caudata* is similar to *V. jolyi* in habit and deciduous leaf blades. However, *V. caudata* has a tristichous phyllotaxis and arcuate leaf blades, with a caudate or attenuate apex, while *V. jolyi* has spirotristichous phyllotaxis and plane leaf blades, with a truncate apex. *Vellozia caudata* forms a clade with *V. hemisphaerica* that is supported, beyond the molecular transformations, by the presence of minor fibrovascular bundles in the leaf, and perhaps by the aquiferous hypodermis extending to bundle sheaths and furrows (Mello-Silva et al., 2011). On the other hand, the taxonomic differentiation of *V. caudata* from *V. campanuloides* (Mello-Silva, 1993) cannot be sustained. The characteristics that supposedly delimit *V. campanuloides*, the attenuate lamina and vessels in minor fibrovascular bundles, are also present in some populations of *V. caudata*. Another supposed autapomorphy, the involute leaves, could be due to the narrowness of the lamina of populations assigned to *V. campanuloides* (e.g., *Harley 26700*, *Mello-Silva 2770*). A similar phenomenon has been observed among populations of *V. hemisphaerica* and *V. hirsuta* Goethart & Henrard (Mello-Silva, 2011). Despite numerous collections of *V. caudata*, seeds have never been found.

Some populations of *Vellozia caudata* from Abaíra and Rio de Contas, in the localities of Arapiranga and Mato Grosso (*Ganev 39*, *173*, *1296*, *2078*, *Mello-Silva 2135*, *2565*, *2765*), show individuals more robust, with longer and wider stems, and fibrovascular bundles in pedicels more numerous, although in a continuous variation from other populations of *V. caudata*. These populations were previously treated as *Vellozia* aff. *caudata* in Mello-Silva et al. (2011), where both emerge in a polytomy together with *V. burlemarxii* and *V. hemisphaerica*, both of these names also synonymized herein. Further resolution of the phylogenetic relationships within this polytomy will cast more light on the taxonomic position of these species.

Additional specimens examined. BRAZIL. **Bahia:** Abaíra, Bem Querer, 13°16′S 41°53′W, *R. M. Harley H50348* (BHCB, CEN, HUEFS, K, MBM, SPF, UEC); Cigano, 13°15′S 41°55′W, *P. T. Sano H52199* (CEPEC, HUEFS not seen, K, SPF); Catolés, Serra do Porco Gordo, Palmeira, 13°23′S 41°46′W, *W. Ganev 173* (HUEFS, K, SPF); Catolés, Serra da Brenha, 13°18′S 41°53′W, *W. Ganev 39* (HUEFS, K, SPF); Anáguas, above falls, 13°17′S 42°53′W, *W. Ganev 1212* (HUEFS not seen, K, SPF); Serra das Brenhas, 13°19′S 41°53′W, *W. Ganev 1296* (HUEFS, K, SPF); Catolés de Cima, Serra de Rei, track by Tijuquinho, 13°16′S 41°54′W, *W. Ganev 1455* (HUEFS not seen, K, SPF); Serra dos Frios, 13°20′S 41°53′W, *W. Ganev 2455* (HUEFS not seen, K, SPF); Serra de Rei, 13°17′S 41°54′W, *W. Ganev 2778* (HUEFS not seen, K, SPF); Catolés, track to Barbado, *A. A. Conceição 663* (SPF); Virassaia, 13°16′S 41°42′W, *Conceição 675* (HUEFS not seen, SPF); Érico Cardoso (Água Quente), Pico das Almas, 17 km NW of Rio de Contas, *S. A. Mori 13590* (CEPEC, NY not seen); Pico das Almas, W slopes, track to Santa Rosa, 23 km W of Érico Cardoso, 13°31′S 42°00′W, *R. M. Harley 27059* (CEPEC, K, SPF); Pico das Almas, W slopes, betw. Paramirim das Crioulas & NNW face of peak, 13°31′S 42°00′W, *R. M. Harley 27514* (CEPEC, K, SPF); Pico das Almas, W slopes, betw. Paramirim das Crioulas & NNW face of peak, 13°31′S 42°00′W, *R. M. Harley 27534* (BHCB, CEPEC, K, MBM, SPF, US); Pico das Almas, valley ca. 5 km NNW from Queiroz, 13°30′13″S 41°58′18″W, *R. Mello-Silva 2770* (SPF); Rio de Contas, Serra das Almas, *P. F. Lützelburg 228* (M); Serra das Almas, *P. F. Lützelburg 252* (M); NE slopes of Pico das Almas, ca. 25 km WNW from Rio de Contas, ca. 13°33′S 41°57′W, *R. M. Harley 19681* (CEPEC, K, SPF); Pico das Almas, *A. M. Giulietti CFCR6857* (HUEFS, K [2], MBM, MO, NY, PRE, R, SPF, U); Pico das Almas, *R. M. Harley 24374* (K, SPF); slopes of Pico das Almas, *R. M. Harley 24477* (CTES, K, MO, SPF, UB); Pico das Almas, E slopes, track Silvina farm–Queiroz, 13°32′S 41°56′W, *R. M. Harley 26133* (CEPEC, K, SPF); Pico das Almas, E slopes, track to peak from Queiroz, 13°32′S 41°58′W, *R. M. Harley 26426* (CEPEC, K, SPF); Pico das Almas, E slopes, track to peak from Queiroz, 13°32′S 41°58′W, *R. M. Harley 26164* (CEPEC, K, SPF); Pico das Almas, E slopes, track to peak from Queiroz, 13°32′S 41°58′W, *R. M. Harley 26165* (CEPEC, K, SPF); Pico das Almas, vertente leste, vale ao SE do Campo do Queiroz, 13°32′S 41°57′W, *R. M. Harley 26530* (CEPEC, F, K, P, R, SP, SPF, UEC); Pico das Almas, E slopes, Queiroz, 13°32′S 41°57′W, *R. M. Harley 27300* (CEPEC, F, K, MBM, NY, RB, SPF); Água Suja river, 13°49′S 42°26′W, *W. Ganev 2078* (HUEFS, K, SPF); Fraga falls, 13°35′59″S 41°49′72″W, *F. Juchum 86* (CEPEC); Fraga falls, near rd., 13°35′56″S 41°49′36″W, *R. Mello-Silva 2132* (HUEFS, K, SPF); Arapiranga, Água Suja river, right edge, 13°25′16″S 41°47′35″W, *R. Mello-Silva 2135* (SPF); Pico das Almas, right of Queiroz, ca. 500 m beyond stream, 13°31′07″S 41°57′27″W, *R. Mello-Silva 2139* (MBM, NY, SPF); Mato Grosso, 14 km from Brumado river dam to Mato Grosso, 13°28′31″S 41°51′10″W, *R. Mello-Silva 2565* (SPF) [idem, *R. Mello-Silva 2765* (SPF)].

3. Vellozia hemisphaerica Seub., Fl. Bras. (Martius) 3(1): 80. 1847. TYPE: Brazil. Bahia: Jacobina, Serra de Jacobina, 1837, *J. S. Blanchet 2544* ([holotype, B not found] lectotype, designated here, G!; isolectotypes, BM!, BR!, E!, K [2]!, LE [2]!, MO not seen, NY not seen, P [2]!). Figure 2A–H.

Vellozia burlemarxii L. B. Sm. & Ayensu, Smithsonian Contr. Bot. 30: 105. 1976, as "*burle-marxii*," syn. nov. TYPE: Brazil. Bahia: Morro do Chapéu, Pedra de Chapéu, 14 Dec. 1968, *R. Burle Marx s.n.* (holotype, US not seen, digital image!).

Caespitose to solitary plants; stems branched to unbranched, 3.5–60 cm, 0.3–6 cm diam. at apex. Leaves tristichous, 5 to 13 extant along apex of each branch; leaf sheaths brown, glabrous, sometimes not exposed; leaf lamina 2–22 cm, 0.2–1.4 cm wide at base, linear-triangular, caudate or acuminate, arcuate, revolute when dry, sometimes involute, marcescent and reflexed when old, glabrous, adaxial surface densely glandular punctate, margins serrate, entire toward base. Flowers 1 to 4 at each branch; pedicels 5–27 cm, purplish to greenish purplish, trigonous, sparsely covered with glandular capitate or stipitate, green emergences. Hypanthium depressed obovoid, circular-trigonous, 3–7 × 4–7 mm, densely covered with glandular capitate or stipitate, deep purple to green emergences, up to 3 mm; hypanthium tube absent. Perianth oblong-elliptic to elliptic, purple or sometimes white; sepals 1.5–4.9 × 0.5–1.3 cm, petals 1.8–4.8 × 0.6–1.7 cm; short glandular capitate or stipitate emergences sparsely covering abaxial surface of sepals and proximal half, or rarely entire length, of central nervature of petals. Stamens 18, in phalanges of 3; filaments (2–)5–7 mm, white; anthers (4–)10–13 mm, yellow; corona absent; styles 15–32 mm, white to yellow; stigma 3–5 mm diam., yellow. Capsule poricidal by apical slits on loculi, 0.5–2 × 0.8–1.5 cm; hypanthium persistent; seeds 0.6–0.7 mm, brown.

Leaf anatomy. Lamina dorsiventral; trichomes absent; cuticle thickened on both surfaces; abaxial furrows ca. 1/3 to 1/2 thickness of lamina, coronulate-papillate; stomata confined to furrows, few present on abaxial surface; subsidiary cells smooth; specialized cells present on adaxial and sometimes on abaxial surfaces; adaxial epidermis 1- to 3-seriate, abaxial epidermis 1-seriate; aquiferous 1- or 2-seriate hypodermis present on both surfaces, extending adaxially and abaxially to bundle sheaths as aquiferous parenchyma; palisade mesophyll 3 or 4 cell-layers thick, adaxially merging with lacunar mesophyll; fibrovascular bundles of two types, smaller radially arranged above furrows, both surrounded by a distinct bundle sheath; large vessels 1 or 2(3) present in each larger fibrovascular bundle, 1 to 3 in each smaller fibrovascular bundle; phloem strands 2, V-shaped, separated beneath xylem by fibers or in smaller bundles separated by parenchyma or united beneath xylem; fibers extending as girders, adaxially and abaxially to aquiferous parenchyma; bundles of subepidermal sclerified cells 1 or 2 cell-layers thick present beneath adaxial surface. Figure 4B, E.

Pedicel anatomy. Triangular in transverse section; fibrovascular bundles 6 to 14; belt of sclerified cells present.

Distribution. *Vellozia hemisphaerica* is relatively widely distributed from Abaíra to Saúde, along almost all the Espinhaço chain in the state of Bahia. The small to medium-sized populations grow on rocky outcrops, either in rocky furrows or over rock, generally in wet places or near streams, at elevations from 600 to 1700 m. Figure 5B.

Phenology. *Vellozia hemisphaerica* has been found in flower in every month except July, and in fruit throughout the year.

IUCN Red List category. *Vellozia hemisphaerica* is the most widely distributed species of the group, occurring throughout a large region, over non-utilizable grounds, with populations more or less extensive. Thus, its conservation status is probably best described as Least Concern (LC), according to IUCN (2001) criteria.

Etymology. The species is named after the striking hemispheric shape of the ovary and constitutes the diagnostic morphological synapomorphy of the group.

Discussion. The majority of populations of *Vellozia hemisphaerica* show a habit similar to that depicted in Figure 2B. Nevertheless, some populations from sandy places at Três Morros, municipality of Piatã, show a much more delicate habit (Fig. 2A). The populations from Morro do Chapéu, until now classified as *V. burlemarxii*, show individuals less robust with leaf blades narrower and involute when dry, the latter character state shared with populations from Piatã (e.g., *Mello-Silva CFCR7414*, *2800*) and with several collections of *V. caudata* with narrow leaf blades (Mello-Silva et al., 2011). There are always six fibrovascular bundles in the pedicels from the populations found in Morro do Chapéu; this number varies from six to 14 in other populations. The perianth of *V. hemisphaerica* is generally purple but, as in other species of *Vellozia* and *Xerophyta* Juss. (Ayensu, 1973; Mello-Silva, 2000, 2005, 2011; Mello-Silva et al., 2011), a white perianth can be found in some individuals.

In Mello-Silva et al. (2011), the two accessions representing *Vellozia hemisphaerica* in cladistics analyses fail to resolve as a supported clade, except in the morphological analysis, where they emerge as sister to *V. burlemarxii*, with this name here considered a synonym. Those results from molecular and combined analyses are paradoxic, as *V. hemisphaerica* is quite distinct from the other species of the group, e.g., in not showing an abscission line between sheath and lamina, the leaf thus being marcescent, and in having the xerophytic type of sclerenchyma pattern. These attributes are shared with *V. burlemarxii*, herein synonymized.

The chosen lectotype for *Vellozia hemisphaerica* is from the original collections at G gathered by Blanchet in Brazil, during his long tenure in Bahia as Swiss consul (Urban, 1896).

Additional specimens examined. BRAZIL. **Bahia:** Abaíra, Ouro Fino, 13°15′S 41°54′W, *B. L. Stannard H52149* (CEPEC, HUEFS, K, MBM, SP, SPF); Barra da Estiva, rd. to Capão da Volta & Jussiape, Serra dos Três Capões, 12 km of Barra da Estiva & 7 km from Km. 177 of Barra da Estiva–Mucugê rd., 13°35′03″S 41°23′06″W, *R. Mello-Silva 2141* (SPF); Ibicoara, Serra do Sincorá, 13°23′S 41°13′W, *M. A. Nóbrega 351* (SPF); Jacobina, Morro do Cruzeiro, 11°11′22″S 40°30′29″W, *F. França 2448* (HUEFS not seen, SPF); N of Serra do Ouro hotel, 11°10′16″S 40°30′32″W, *R. Mello-Silva 2828* (SPF); Lençóis, Mucujezinho river, near Poço do Diabo, *A. A. Conceição 184* (HUEFS, SPF); Morro do Chapéu, Ferro Doido river, ca. 18 km E of Morro do Chapéu, *H. S. Irwin 32520* (C, F, IAN not seen, K, NY not seen); Agreste river, *G. G. Hatschbach 39691* (BR, C, MBM, SPF); 19.5 km of the town of Morro do Chapéu on the rd. (BA 052) to Mundo Novo, Ferro Doido river, 41°02′W 11°38′S, *R. M. Harley 19287* (CEPEC, K, RB, SPF); *N. L. Menezes CFCR379* (K [3], SPF); rd. Morro do Chapéu-Jacobina, 11°28′58″S 41°05′04″W, *A. M. Giulietti PCD3255* (ALCB not seen, CEPEC not seen, HRB, HUEFS not seen, K not seen, SPF); 1 km SE from Morro do Chapéu on rd. to Mundo Novo, 11°33′32″S 41°08′48″W, *R. Mello-Silva 2148* (SPF); ca. 7 km E of Morro do Chapéu, 11°34′24″S 41°06′28″W, *F.*

França 4030 (HUEFS not seen, SPF); BR 052, vic. of bridge over Ferro Doido river, ca. 18 km E of Morro do Chapéu, *S. A. Mori 14507* (CEPEC, K, NY, SPF); near Ferro Doido falls, *L. P. Felix 7540* (IPA); Ferro Doido river, 22 km E of Morro do Chapéu, 11°37′36″S 41°00′07″W, *F. França 2785* (HUEFS not seen, SPF); Ferro Doido falls, 11°37′41″S 41°12′03″W, *C. Correia 124* (HUEFS); Ferro Doido river, 18 km SE from Morro do Chapéu on rd. to Mundo Novo, 11°37′33″S 41°00′15″W, *R. Mello-Silva 2149* (SPF); cultivated at Burle Marx's estate, *N. L. Menezes 399* (SPF); *N. L. Menezes 653* (SPF); s.d., *R. Burle Marx s.n.* (RB 160609); cultivated at Univ. São Paulo, *N. L. Menezes 1162* (SPF); Palmeiras, Pai Inácio, BR 242, Km. 232, ca. 15 km NE of Palmeiras, *S. A. Mori 12916* (CEPEC, NY not seen); Morro do Pai Inácio, 12°27′45″S 41°38′15″W, *L. P. Queiroz 1999* (HUEFS not seen, SPF); Morro do Pai Inácio, entre 12°27′25″S 41°28′40″W e 12°27′19″S 41°28′24″W, *V. C. Souza 5230/CFCR15541* (K, SPF); Pai Inácio, 12°27′20″S 41°28′15″W, *A. M. Carvalho PDC975* (ALCB, CEPEC, HUEFS not seen, K, SPF); Pai Inácio, Platô da Cruz, *A. A. Conceição 113* (SPF); Morro do Pai Inácio, along BR-242, 12°27′37″S 41°28′40″W, *M. Alves EBNN1018* (UFP); Piatã, Serra do Gentio, betw. Piatã & Serra da Tromba, *R. Mello-Silva et al. CFCR7414* (SPF); Serra da Tromba, rd. Piatã to "gerais da serra," via soccer field, 13°08′S 41°50′W, *W. Ganev 951* (HUEFS not seen, K, MBM, SPF); Serra de Santana, track to Capela do Senhor do Bonfim chapel, immediately E of Piatã, 13°09′04″S 41°45′54″W, *R. Mello-Silva 2576* (SPF); Morro dos Três Morros, Serra do Gentio, São Bartolomeu ("Bertolameu"), NNW base of Morro do Navio, 9.3 km N of Piatã on rd. Piatã–Boninal (BA 148) and 7.1 km W on vicinal rd. to Inúbia, 6.8 km NNW from that rd., 13°02′04″S 41°54′14″W, *R. Mello-Silva 2800* (SPF [2]); Pindobaçu, rd. from Carnaíba to Itapicuru, margins of Itapicuru river, cultivated at Univ. São Paulo, *N. L. Menezes 1303* (SPF); Saúde, rd. to Paiaió falls, 10°54′02″S 40°26′55″W, *M. L. Guedes PDC2903* (CEPEC).

4. **Vellozia jolyi** L. B. Sm., Bradea 4: 133. 1985. TYPE: Brazil. Bahia: Mucugê, Capa Bode Mtns., Andaraí–Mucugê rd., 1000 m, 2 Nov. 1973, *A. B. Joly s.n. & N. L. Menezes 316* (holotype, SP!; isotype, SPF!). [cf. "without exact locality," Smith, 1985: 133.] Figure 3A–H.

Caespitose plants; stems branched or not, 3–35 cm, 2–6 mm diam. at apex. Leaves spirotristichous, 5 to 27 extant along apex of each branch; leaf sheaths brown, light brown to cinereous at apex, glabrous, sometimes with emergences abaxially toward apex; leaf lamina 1–6.5 cm, 1.5–4 mm wide at base, linear-triangular, abruptly acute, plane, revolute when dry, soon deciduous by abscission line, glabrous, adaxial surface densely glandular punctate, margins serrate, sometimes entire. Flower 1 at each branch; pedicel 4.5–14 cm, purplish green, trigonous, sparsely covered with glandular capitate or stipitate emergences. Hypanthium depressed obovoid, circular to trigonous, (1–)2–5 × 1.5–6 mm, purplish green to green, densely covered with glandular capitate or stipitate purple emergences, up to 4 mm; hypanthium tube absent; perianth oblong-elliptic to elliptic, purple, purplish blue, pinkish, or white; sepals 12–25 × 5–8 mm, petals 12–23 × 6–9 mm; short glandular capitate or stipitate emergences laxly covering abaxial surface of sepals and proximal half of central nervature of petals; stamens 12 to 18, either 3 opposite to sepals and 9 to petals, in phalanges of 3, or all in phalanges of 3, with the lateral 2 smaller than central; filaments 2–6 mm, purple to white; anthers 3–7 mm, yellow; corona absent; styles ca. (10–)13–17 mm, white; stigma 1.5–3 mm diam., yellow. Capsule poricidal by apical slits on the loculi, 3–5(–10) × ca. 10 mm, hypanthium persistent; seeds 0.7–1 mm, brown.

Leaf anatomy. Lamina dorsiventral; trichomes absent; cuticle not thickened or thickened on adaxial surface or on both surfaces; abaxial furrows ca. 1/4 thickness of lamina, sometimes absent, papillae inconspicuous or absent; stomata confined to furrows or to region between 2 fibrovascular bundles on abaxial surface when furrows absent; subsidiary cells smooth; specialized cells present on adaxial, rarely on abaxial, surface; adaxial and abaxial epidermis 1- to 2-seriate; aquiferous 1- to 2-seriate hypodermis present on both surfaces, extending adaxially, and sometimes abaxially, to bundle sheaths as aquiferous parenchyma; palisade mesophyll 3 or 4 cell-layers thick, adaxially merging with lacunar mesophyll; fibrovascular bundles of one type, surrounded by a distinct bundle sheath; large vessels 1 to 3 present in each fibrovascular bundle; phloem strands 2, V- or U-shaped, separated beneath xylem by fibers and parenchyma; fibers extending as girders, adaxially to aquiferous parenchyma and abaxially to hypodermis or to aquiferous parenchyma; bundles of subepidermal sclerified cells 1 or 2 cell-layers thick present beneath both surfaces. Figure 4H, I.

Pedicel anatomy. Triangular in transverse section; fibrovascular bundles 6; belt of sclerified cells present.

Distribution. *Vellozia jolyi* is endemic to the middle portion of the Espinhaço chain in Bahia, from Mucugê to Lençóis, where the highest concentrations and dense populations grow on flat, rocky outcrops, at elevations from 800 to 1500 m. Figure 5B.

Phenology. *Vellozia jolyi* flowers and fruits throughout the year.

IUCN Red List category. *Vellozia jolyi* is distributed over a relatively extended region, with dense and localized populations over non-utilizable grounds.

Thus, its conservation status is probably best described as Least Concern (LC), according to IUCN (2001) criteria.

Etymology. The species is named after Aylthon Brandão Joly, who initiated studies on phanerogamic systematics at University of São Paulo, Brazil, especially on campos rupestres vegetation, which comprises the habitat of the majority of the Velloziaceae.

Discussion. In cladistics analyses *Vellozia jolyi* has been sister to *V. religiosa*, and they share the apomorphies of a spirotristichous phyllotaxis, the distal portion of leaf blade truncate, and flowers always solitary (Mello-Silva et al., 2011). *Vellozia jolyi* can be differentiated from *V. religiosa* by the absence of minor fibrovascular bundles in its leaves, which are wider, more patent, and not mucronate. Northern populations of *V. jolyi*, from Guiné, in Mucugê, to Lençóis (e.g., *Conceição 983*, *Mello-Silva CFCR7161*), are composed of more robust plants without leaf furrows (Figs. 3E, 4H) and generally with 18 stamens, although this can vary from 12 to 18, as in *Mello-Silva 2146* and *Conceição 968*, whose flowers bear 12, 15, or 18, and 15 to 18 stamens, respectively. The irregular number of stamens is due to the sporadic occurrence of extra stamens or their suppression in flowers (Fig. 3C). Southern populations, such as the type material from Serra do Capa Bode in Mucugê (Fig. 3A–D), are composed of less robust individuals. These always bear 12 stamens, and the furrows in the leaf blades may or may not be present (Fig. 4I). Plasticity in stamen number and in furrows is not an uncommon feature within some groups of *Vellozia* (Mello-Silva, 1990, 1995, 2000). Nevertheless, two stamens opposite to each tepal, as depicted by Smith (1985) when describing *V. jolyi*, was an erroneous representation. Perianth color in *V. jolyi* varies from purple, which is more common, to almost white.

Additional specimens examined. BRAZIL. **Bahia:** Andaraí, margins of Apiaba river, 22 Apr. 1981, *C. T. Rizzini s.n.* (SPF 32952); Apiaba river, *G. G. Hatschbach 48225* (BR, C, CEPEC, HRB, K, MBM not seen, SPF); Igatu, Gruta do Brejão, *J. G. Jardim 2320* (CEPEC not seen, SPF); Lençóis, Serra dos Lençóis, Serra Larguinha, ca. 2 km NE of Caeté-Açu (Capão Grande), 12°36′S 41°29′W, *R. M. Harley 22573* (CEPEC not seen, K not seen, SPF); Serra Larga (Serra Larguinha), W of Lençóis, near Caeté-Açu, 12°36′S 41°29′W, *R. Mello-Silva CFCR7161* (K, MBM, SP, SPF); Serra Larguinha, W of Capão, *R. Kral 72801* (SP, SPF); Serra Larga, July 1985, *C. A. M. Scaramuzza s.n.* (SPF 39881); Fumaça falls, *A. A. Conceição 187* (SPF); near Fumaça falls, *A. A. Conceição 617* (SPF); on track to Fumaça falls, *A. A. Conceição 968* (SPF); Serra Larguinha, on top of hill on track to Fumaça falls, 12°36′07″S 41°28′41″W, *R. Mello-Silva 2146* (SPF); Mucugê, Serra do Capa Bode, Nov. 1973, *G. C. P. Pinto s.n.* (ALCB 954, HRB); Serra do Arenito, 11 Mar. 1974, *D. Andrade-Lima s.n.* (F, MBM, NY, R, RB, SPF 32846, U, UB, US); Serra do Sincorá, 7 km N of Mucugê on rd. to Andaraí, *C. E. Calderón 2424* (CEPEC, K, SPF, US not seen); rio Cumbica, ca. 3 km N of Mucugê on rd. to Andaraí, 12°59′S 41°21′W, *R. M. Harley 18699* (CEPEC not seen, K, SPF); rd. Andaraí–Mucugê, 3 Apr. 1977, *K. Mori s.n.* (SPF 32977); 10–12 km NW of Mucugê, on rd. to Andaraí, 12°57′S 41°20′W, *S. A. Mori 12665* (CEPEC, NY not seen, US not seen); ca. 2 km on rd. to Andaraí, 12°59′S 41°21′W, *R. M. Harley 20580* (CEPEC, F, IPA, K [2], MBM, MO, NY, PRE, R, RB, SP, SPF, U, UEC, US); near Mucugê, 12°58′58″S 41°21′07″W, *A. P. Araújo 292* (HRB, SPF); *N. L. Menezes 1014* (IPA, K, MBM, MO, RB, SPF, U); main valley N of Mucugê from 3 to 8 km N of town, *R. M. King 8733* (K, US not seen); *N. L. Menezes 1154* (K, SPF); rd. Andaraí–Mucugê, *A. M. Giulietti CFCR7092* (K, SPF); rd. Andaraí–Mucugê, 27 km S of Andaraí, beyond Piaba river, *M. G. L. Wanderley 941* (SP, SPF); rd. Andaraí–Mucugê, 27 km S of Andaraí, near cross of Piaba river, *M. G. L. Wanderley 949* (SP, SPF); near town, *G. G. Hatschbach 50090* (BR, C, HRB, HUA, K, MBM not seen, SPF); beyond Cumbuca river, 12°18′S 41°19′W, *J. S. Assis 424* (HRB); rd. to Andaraí, Km. 28, bridge over Piaba river, 12°57′S 41°16′W, *M. Luceño EBNN317* (UFP); rd. Andaraí–Mucugê, near Embratel tower, 12°57′26″S 41°19′14″W, *D. J. N. Hind PCD3547* (ALCB not seen, CEPEC not seen, HRB, HUEFS not seen, K, SPF); Pedra Redonda, betw. Preto & Paraguaçu rivers, 21°57′00″S 41°24′27″W, *R. M. Harley PCD3642* (ALCB, CEPEC, HUEFS not seen, K, SPF); near confluence of Mucugê & Cumbuca rivers, *H. P. Bautista UMS74* (HRB); 8 km of Mucugê on rd. to Andaraí, near Embratel tower, *H. P. Bautista 2942* (HRB [2]); Guiné, *A. A. Conceição 714* (SPF); Guiné, *Conceição 901* (SPF); Guiné, Serra do Esbarrancado, *A. A. Conceição 956* (SPF); Guiné, Serra do Esbarrancado, *A. A. Conceição 983* (SPF); Mpio. park, 12°59′18″S 41°20′27″W, 25 Jan. 2003, *N. Roque s.n.* (ALCB 61399 not seen, SPF); rd. Mucugê–Andaraí, 8.9 km of Mucugê, near TV tower, 12°57′30″S 41°19′15″W, *R. Mello-Silva 2145* (SPF); slopes of Serra da Tesoura, 13°07′50″S 41°20′53″W, *E. L. Borba 1888* (HUEFS not seen, SPF); Pico do Gobira, 13°04′36″S 41°22′40″W, *E. B. Souza 1017* (HUEFS, SPF); cultivated at Roberto Burle Marx's estate, *N. L. Menezes 451* (SPF).

5. **Vellozia religiosa** Mello-Silva & D. Sasaki, sp. nov. TYPE: Brazil. Bahia: Piatã, Três Morros, 13°04′S 41°54′W, 1400 m, 10 Mar. 1992, *B. L. Stannard H51864* (holotype, SPF!; isotypes, CEPEC not seen, HUEFS not seen, K!). Figure 1C–I.

Foliis spiraliter trifariis apicem versus abrupte acutis atque floribus semper solitariis *Velloziae jolyi* L. B. Sm. appropinquat, sed ab ea foliis mucronatis minus patentibus nervis minoribus supra sulcos instructis differt.

Caespitose plants; stems with no to few branches, 10.5–18 cm, ca. 3 mm diam. at apex. Leaves spirotristichous, 5 to 16 extant along apex of each branch; leaf sheaths brown, cinereous at apex, glabrous, often with emergences; leaf lamina 1.3–

2.5 cm, 1–2 mm wide at base, linear-triangular, abruptly acute, mucronate, plane, involute when dry, soon deciduous by abscission line, sparsely disposed emergences on distal half of abaxial surface and sometimes on adaxial surface, otherwise glabrous, adaxial surface densely glandular punctate, margins entire, sometimes obscurely serrate. Flower 1 at each branch; pedicel ca. 5.5 cm, purplish green to green, trigonous, sparsely covered with glandular capitate or stipitate emergences. Hypanthium depressed obovoid, circular-trigonous, ca. 2 × 4 mm, purplish green to green, densely covered with glandular capitate or stipitate emergences, up to 2 mm; hypanthium tube absent; perianth oblong to elliptic, purple; sepals ca. 10 × 5 mm, petals ca. 12 × 6 mm; short glandular capitate or stipitate emergences laxly covering abaxial surface of sepals and proximal half of central nervature of petals; stamens 12, three opposite to sepals, 9 opposite to petals, in phalanges of 3, with lateral 2 smaller than central; filaments ca. 8 mm, purple to white; anthers ca. 5 mm, yellow; corona absent; style ca. 16 mm, white; stigma 0.5 mm diam., yellow. Capsule poricidal by apical slits on loculi, ca. 3 × 6 mm, hypanthium persistent; seeds ca. 1 mm, brown.

Leaf anatomy. Lamina dorsiventral; trichomes absent; cuticle thickened on both surfaces; abaxial furrows ca. 1/3 thickness of lamina, papillae absent; stomata confined to furrows, few present on abaxial surface; subsidiary cells smooth; specialized cells present on both surfaces; adaxial and abaxial epidermis 1- or 2-seriate; aquiferous 1-seriate hypodermis present on adaxial surface, extending adaxially to bundle sheaths as aquiferous parenchyma; palisade mesophyll 4 cell-layers thick, adaxially merging with lacunar mesophyll; fibrovascular bundles of two types, smaller radially arranged above furrows, both surrounded by a distinct bundle sheath; large vessels 1 or 2 present in each larger fibrovascular bundle, absent in smaller fibrovascular bundle; phloem strands 2, V-shaped, in larger fibrovascular bundles separated beneath xylem by parenchyma; in smaller fibrovascular bundles united beneath xylem; fibers extending as girders, adaxially to aquiferous parenchyma and abaxially to hypodermis; bundles of subepidermal sclerified cells 1(2) cell-layers thick present beneath adaxial surface. Figure 4G.

Pedicel anatomy. Triangular in transverse section; fibrovascular bundles 6; belt of sclerified cells present.

Distribution. *Vellozia religiosa* is endemic to three localities in Barra da Estiva and Piatã, in the southern part of Espinhaço chain in Bahia. It occurs in Piatã, near the city and also at Serra do Gentio in the locality of Três Morros, and between Barra da Estiva and Jussiape, along the old road to Mucugê. It was observed to grow in small populations on rocky outcrops, at elevations from 1200 to 1400 m. Figure 5B.

Phenology. *Vellozia religiosa* has been collected with flowers in March and with fruits in February to April.

IUCN Red List category. There are only three currently known relatively small populations of *Vellozia religiosa*. Nevertheless, they occur over non-utilizable grounds, so its conservation status is probably best described as Least Concern (LC), according to IUCN (2001) criteria.

Etymology. The epithet of the new species is coined after the population that grows along the pilgrimage track to Senhor do Bonfim (Our Lord of the Good End) chapel, on the slopes of Serra de Sant'Ana (St. Anne Mountains), near Piatã.

Discussion. In cladistics analyses *Vellozia religiosa* has been sister to *V. jolyi* (Mello-Silva et al., 2011) but differs by having minor fibrovascular bundles in the leaves, which are themselves more erect, narrower, mucronate, and pungent. The individuals tend also to be less robust than individuals from *V. jolyi*, although the flowers, having 12 stamens, are quite similar to those from southern populations of *V. jolyi*. Both species are, in addition, allopatric.

Paratypes. BRAZIL. **Bahia:** Barra de Estiva, Serra do Sincorá, ca. 15–19 km W of Barra da Estiva, on rd. to Jussiape, 13°35′S 41°27′W, *R. M. Harley 20737* (CEPEC not seen, K not seen, SPF [2]); Piatã, Serra de Santana, 13°09′S 41°46′W, *L. P. Queiroz H51524* (CEPEC not seen, HUEFS not seen, K, SPF); Serra de Santana, track to Senhor do Bonfim chapel, immediately E of town, 13°09′04″S 41°45′54″W, *R. Mello-Silva 2577* (SPF).

KEY TO VELLOZIA HEMISPHAERICA GROUP SPECIES AMONG BRAZILIAN VELLOZIACEAE

1a. Corona always present, with flattened (petaloid) appendages; stamens 6; stigma capitate, clavate, linear or subapical .... *Barbacenia* Vand.
1b. Corona absent or with fringed or alate appendages; stamens (6 to)18–36(to 74); stigma trilobate-peltate ... *Vellozia* Vand.

2a. Ovary and fruit as long as or, generally, longer than broad .... *Vellozia*, excluding V. hemisphaerica group
2b. Ovary and fruit broader than long .... Vellozia hemisphaerica group
  3a. Leaf without abscission line, leaf blade persistent and reflexed .... 3. *V. hemisphaerica* Seub.
  3b. Leaf with abscission line, leaf blade deciduous.
    4a. Leaf apex abruptly acute; phyllotaxis spirotristichous.
      5a. Dry leaf blade revolute, apex not mucronate; stamens 12 to 18; minor fibrovascular bundles in leaf absent .... 4. *V. jolyi* L. B. Sm.
      5b. Dry leaf blade involute, apex mucronate; stamens 12; minor fibrovascular bundles in leaf present .... 5. *V. religiosa* Mello-Silva & D. Sasaki
    4b. Leaf apex long attenuate to caudate; phyllotaxis tristichous.
      6a. Stem 80–300 cm; stamens 48 to 66; corona present; flowers 1 to 3, subsidiary cells ridged .... 1. *V. canelinha* Mello-Silva
      6b. Stem 3.5–35 cm; stamens (16 to)18; corona absent; flower 1, subsidiary cells smooth .... 2. *V. caudata* Mello-Silva

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